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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TETSUYA KANBE, KAZUYA NIWA,
YUJI MURAKAMI, and LEI ZHANG

Appeal 2015-007189
Application 13/764,144
Technology Center 2600

Before DENISE M. POTHIER, LARRY J. HUME, and
MATTHEW J. McNEILL, *Administrative Patent Judges*.

POTHIER, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 1–8. Br. 14, which constitute all the claims pending in this application.¹ We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

¹ Throughout this opinion, we refer to (1) the Final Action (Final Act.) mailed May 14, 2014, (2) the Advisory Action (Adv. Act.) mailed

Invention

Appellants' invention concerns a magnetic recording medium used in a hard disk drive (HDD). *See Spec.* 1:6–7. The medium provides favorable thermal stability due to high magneto crystalline anisotropy (Ku) and a high medium signal to noise ratio (SNR) and reduces magnetic switching field distribution (SFD). *Id.* at 1:24–25, 2:23–25, and 3:10–14. The invention also provides magnetic recording and reproducing apparatus having the magnetic recording medium for reducing an error rate and increasing its capacity. *Id.* at 3:12–14. Claim 1 is reproduced below with emphasis:

1. A magnetic recording medium having *a structure in which at least an underlayer, a first magnetic recording layer and a second magnetic recording layer are sequentially stacked on a substrate,*

wherein the first magnetic recording layer includes an alloy having an L1₀ structure as a main component, and

wherein the second magnetic recording layer includes a non-crystalline alloy containing Co as a main component and containing Zr of 6 to 16 atomic percent and at least one element of B and Ta.

The Examiner relies on the following as evidence of unpatentability:

Matsunuma	US 6,815,098 B2	Nov. 9, 2004
Takahashi	US 2004/0257920 A1	Dec. 23, 2004
Soeya	US 2007/0048552 A1	Mar. 1, 2007
Oikawa	US 2009/0310254 A1	Dec. 17, 2009
Chen	US 2011/0262776 A1	Oct. 27, 2011
Sayama	US 2012/0214021 A1	Aug. 23, 2012

September 8, 2014, (3) the Appeal Brief (Br.) filed December 22, 2014, and (4) the Examiner's Answer (Ans.) mailed May 22, 2015.

Appellants provide the following as evidence of patentability:

S.N. Piramanayagam, *Perpendicular Recording Media for Hard Disk Drives*, 102 J. of Applied Phy. 011301-1–011301-22 (2007) (“Piramanayagam”).

Sakhrat Khizroev & Dmitri Litvinov, *Perpendicular Magnetic Recording* 1–10 (2004) (“Khizroev”).

The Rejections

Claims 1, 4, and 5 are rejected under 35 U.S.C. § 103(a) as unpatentable over Takahashi, Oikawa, and Matsunuma. Ans. 2–5.

Claims 2 and 3 are rejected under 35 U.S.C. § 103(a) as unpatentable over Takahashi, Oikawa, Matsunuma, and Chen. Ans. 5–6.

Claim 6 is rejected under 35 U.S.C. § 103(a) as unpatentable over Takahashi, Oikawa, Matsunuma, and Sayama. Ans. 6.

Claim 7 is rejected under 35 U.S.C. § 103(a) as unpatentable over Takahashi, Oikawa, Matsunuma, Soeya, and Sayama. Ans. 7–8.

Claim 8 is rejected under 35 U.S.C. § 103(a) as unpatentable over Soeya, Takahashi, Oikawa, and Matsunuma. Ans. 8–11.

THE OBVIOUSNESS REJECTION OVER TAKAHASHI, OIKAWA, AND MATSUNUMA

Regarding independent claim 1, the Examiner finds that Takahashi teaches many of its limitations, including an underlayer, a first magnetic layer, and a second magnetic layer sequentially stacked. Ans. 2–3 (citing Takahashi ¶ 68, Fig. 8). The Examiner turns to Oikawa and Matsunuma in combination with Takahashi to teach the recited main components and

structure of the first and second magnetic layers. Ans. 3–4 (citing Oikawa ¶¶ 50, 67–72 and Matsunuma 11:11–29, 27:45–55).

Appellants argue that “the Examiner misunderstands that the ‘soft magnetic backing layer’ in Oikawa corresponds to a [recited] magnetic recording layer.” Br. 6; *see also id.* at 6–8 (discussing Piramanayagam and Khizroev). Appellants conclude “it is unreasonable that the soft magnetic backing layer described in Oikawa corresponds to the ‘second magnetic recording layer’ recited in present claim 1.” *Id.* at 9. Appellants further assert that “[o]ne of ordinary skill in the art would not consider that the soft magnetic backing layer is a part of magnetic recording layers.” *Id.* at 10. Appellants also contend claim 1 requires the layers to be “sequentially stacked” and that Oikawa, to the contrary, teaches the soft magnetic backing layer located between the perpendicular recording layer and the substrate. *Id.* at 11–12 (citing Oikawa ¶ 6). Appellants argue it would not be obvious to modify Takahashi using Oikawa’s teaching to yield the recited second magnetic recording layer. *Id.* at 12–13.

ISSUES

Under § 103, has the Examiner erred in rejecting claim 1 by finding that Takahashi, Oikawa, and Matsunuma collectively would have taught or suggested a magnetic recording medium having:

- I. “a second magnetic recording layer” and
- II. “a structure in which at least an underlayer, a first magnetic recording layer and [the] second magnetic recording layer are sequentially stacked”?

ANALYSIS

I.

Appellants argue the claimed “second magnetic recording layer” cannot reasonably be construed to include Oikawa’s soft magnetic backing layer. *See* Br. 6–9. In particular, Appellants argue “the Examiner misunderstands that [(1)] the ‘soft magnetic backing layer’ in Oikawa” and (2) “the ‘perpendicular double-layered medium’ in Oikawa.” Br. 6. We thus begin by construing “a second magnetic recording layer” as recited in claim 1.

The Specification does not define the phrase “second magnetic recording layer.” *See generally* Spec. In fact, although describing the layer structure as a “magnetic recording medium” (Spec. 13:5, 7; *see also id.* at 14:1–3), the disclosure does not use the term “recording” to describe the first magnetic layer and the second magnetic layer (*id.* at 3:16–18, 13:13, 16 (discussing “first magnetic layer 105” and “second magnetic layer 106”), 22:8, 12). Even so, an ordinary meaning of a “magnetic recording layer,” as broadly recited in claim 1, includes a layer that is magnetic and assists in or permits recording.

Turning to the rejection, the Examiner indicates that one would have found it obvious to modify Takahashi’s first and second magnetic recording layers such that they correspond to the perpendicular double-layered medium of Oikawa. *See* Ans. 2–3. In the Response to Argument section of the Examiner’s Answer, the Examiner clarifies the rejection by indicating reliance

upon the Oikawa reference as teaching the obviousness of forming the first and second magnetic recording layers in Takahashi from the *materials* utilized by Oikawa, further

stating the combination would yield a second recording layer (see “74” in fig. 8 of Takahashi) functioning to aid in recording to the first recording layer (see “73” in fig. 8 of Takahashi).

Ans. 18 (emphasis added).

As such, the Examiner finds Takahashi teaches a second magnetic layer (i.e., corresponding to element 74 in Figure 8, *cited in* Ans. 2) but that this layer in Takahashi does not contain the specifically-recited composition of “a non-crystalline alloy containing Co as a main component and containing Zr of 6 to 16 atomic percent and at least one element of B and Ta,” in claim 1. *See* Ans. 17–18; *see also* Takahashi ¶ 123 (describing layer 74 as an “auxiliary recording layer”). The rejection thus proposes to use the specific materials contain in a known magnetic layer (e.g., the soft magnetic backing layer), as taught by Oikawa, within Takahashi’s second magnetic layer (element 74). *See* Ans. 2–4, 18.

We are not persuaded that the resulting Takahashi/Oikawa magnetic recording layer as proposed by the rejection (e.g., element 74 as modified) fails to correspond to the recited “second magnetic recording layer” in claim 1. Br. 6–8. As noted, the rejection does not propose to substitute Takahashi’s first and second magnetic layers as arranged for Oikawa’s perpendicular magnetic recording layer or that the perpendicular double-layered medium in Oikawa corresponds to the double-layer structure of magnetic recording layers recited in claim 1. *See* Ans. 17–18. Rather, the rejection states that Takahashi’s second magnetic layer remains as arranged but contains the magnetic layer materials taught by Oikawa. *See* Ans. 18.

Concerning Appellants’ argument that Oikawa’s soft magnetic backing layer is “a characteristic layer in perpendicular recording” (Br. 7 (discussing Piramanayagam 8 (left col.) and Fig. 9(b))) differing from the

recited “second magnetic recording layer” (*id.*), we are not persuaded. Claim 1 recites “a second magnetic recording layer.” Br. 15, Claims App’x. There is no recitation in claim 1 limiting the recited “second magnetic recording layer” to (1) a “perpendicular” double-layered medium (*id.* at 6–7), (2) a specific, technical role (*id.* at 8–9), or (3) a specific thickness (*id.* at 9–10). Claim 1 also does not recite that the magnetic recording medium or the “second magnetic recording layer” reduces the magnetic switching field. *Id.* at 11. We thus agree with the Examiner that Appellants are arguing for a more “narrow interpretation” (*id.* at 12) of the recited, “second magnetic recording layer” than is claimed. Accordingly, many of Appellants’ arguments, including those addressing Piramanayagam and Khizroev (*see id.* at 6–9), are not commensurate in scope with claim 1.

We further are not convinced that the resulting Takahashi/Oikawa second magnetic recording layer as the Examiner proposes cannot perform as the recited “second magnetic recording layer.” Oikawa teaches a magnetic layer having the recited composition in claim 1’s “second magnetic recording layer” assists in passing and returning a magnetic field to the magnetic head. Oikawa ¶ 67, *cited in* Ans. 12–13. Based on this teaching, the Examiner concludes the resulting second magnetic recording layer of the Takahashi/Oikawa combination would “function[] to aid in recording the first recording layer” (e.g., 73) (*id.* at 18) and “assist[s] in the process of recording to the first recording layer” (*id.* at 11). Thus, the resulting Takahashi/Oikawa second magnetic recording layer plays a role in recording and corresponds reasonably to the recited “second magnetic recording layer” as broadly as recited. *See* Ans. 12–13.

Moreover, we are not persuaded that the resulting Takahashi/Oikawa second magnetic recording layer cannot perform multiple functions. In other words, Oikawa teaches a magnetic layer having the recited composition in claim 1's "second magnetic recording layer" assists in passing and returning a magnetic field to the magnetic head. Oikawa ¶ 67. However, this teaching does not detract from Takahashi's layer 74 being an auxiliary *recording* layer. Takahashi ¶ 123, Fig. 8. As such, the aiding function discussed by Oikawa does not change the already-existing function of Takahashi's auxiliary, magnetic *recording* layer 74 (Takahashi ¶ 123, Fig. 8). *See* Ans. 2, 18. The resulting combination of Takahashi and Oikawa suggests "a second magnetic recording layer" that acts both as a recording layer as disclosed by Takahashi and further assists in recording at the first magnetic recording layer as taught by Oikawa. Accordingly, contrary to Appellants' contentions (Br. 10), the resulting magnetic layer would be considered part of the magnetic recording layers as recited.

Lastly, Matsunuma is further relied upon to teach the recited materials within the "second magnetic recording layer." Ans. 4 (discussing the specifically recited atomic percent of Zirconium within a magnetic layer of CoTaZr). Similar to Oikawa discussed above, Takahashi teaches the second magnetic recording layer, and when combining Matsunuma's teaching with Takahashi and Oikawa as proposed, the combination results in "second magnetic recording layer" having an alloy containing the recited material composition that assists in applying magnetic fields. *See id.* Thus, to the extent Takahashi and Oikawa do not teach the recited "second magnetic recording layer" as argued (*see* Br. 13), Matsunuma cures the purported deficiencies.

Based on the above discussion, we determine the Examiner has not erred in determining Takahashi, Oikawa, and Matsunuma teach or suggest “a second magnetic recording layer.”

II.

Appellants also argue Takahashi and Oikawa, as combined, do not teach “a structure in which at least an underlayer, a first magnetic recording layer and [the] second magnetic recording layer are sequentially stacked.” Br. 11–13. Specifically, Appellants contend that claim 1 requires the layers to be “sequentially stacked” and that Oikawa, to the contrary, teaches the soft magnetic backing layer located between the perpendicular recording layer and the substrate. *Id.* at 11–12 (citing Oikawa ¶ 6); *see also id.* at 8–9. Accordingly, Appellants assert that it would not be obvious to modify Takahashi using Oikawa’s teaching to correspond to the recited second magnetic recording layer as arranged. *Id.* at 12–13.

As noted above, the Examiner is not proposing a wholesale substitution of Takahashi’s magnetic recording medium having first and second stacked magnetic layers (e.g., 73, 74) for Oikawa’s arrangement. Ans. 18. Rather, the Examiner maps the “second magnetic recording layer” to element 74 in Takahashi’s Figure 8, which is then modified to have the specific materials of a known magnetic layer as taught by Oikawa. Ans. 3, 18. Notably, the test for obviousness is what the combined teachings of Takahashi and Oikawa would have suggested to one skilled in the art and not whether the features of Oikawa may be bodily incorporated into Takahashi. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981)).

Given the proposed combination, the resulting second magnetic layer would not be moved so as to be (1) between the perpendicular recording

layer and the substrate (Br. 11–12) or (2) “located on the opposite side of the single pole head with reference to the perpendicular magnetic recording layer” (*id.* at 8). Instead, the second magnetic layer in Takahashi (i.e., element 74) remains in its location in Figure 8 (Takahashi, Fig. 8) but is made from the material taught by Oikawa. *See* Ans. 3. 18.

Appellants also contend that Oikawa teaches away from using its soft underlayer (SUL) “to solve the problem” of reducing the magnetic switching field distribution (SFD), and “[o]ne skilled in the art could not predict the preferable results by adopting the soft magnetic backing layer in Oikawa as the second magnetic recording layer.” *Id.* at 12. These arguments are unavailing. Appellants have not demonstrated that Takahashi or Oikawa discourage one skilled in the art from using the material taught by Oikawa’s magnetic layer within Takahashi’s magnetic layer (i.e., 74). Specifically, the record has insufficient evidence to demonstrate that one skilled in the art would have been discouraged from following the path of selecting the materials taught by Oikawa’s magnetic layer within Takahashi’s layer 74. *See In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). Additionally, Takahashi’s resulting magnetic layer 74, as modified by Oikawa, would result in a second magnetic layer that is still a recording layer, as Takahashi suggests, but performs another function of assisting in recording by (1) passing magnetic fields from the magnetic head to the first magnetic recording layer (e.g., 73) located beneath the second magnetic head as shown in Takahashi’s Figure 8 and (2) returning magnetic fields to the magnetic head from the first magnetic recording layer. *See* Oikawa ¶ 67, *cited in* Ans. 3; *see also* Ans. 18.

Therefore, we disagree with Appellants that the resulting structure based on Takahashi's and Oikawa's teachings, as proposed by the Examiner, fails to teach "a structure in which at least an underlayer, a first magnetic recording layer and [the] second magnetic recording layer are sequentially stacked," as recited in claim 1.

For the foregoing reasons, Appellants have not persuaded us of error in the rejection of independent claim 1 and dependent claims 4 and 5 not separately argued.

THE REMAINING OBVIOUSNESS REJECTIONS

Claims 2, 3, and 6–8 are rejected under 35 U.S.C. § 103(a) as unpatentable over Takahashi, Oikawa, and Matsunuma in combination with at least one other reference (Chen, Sayama, and Soeya). Ans. 5–11. Other than stating that the remaining, cited references do not cure the deficiencies of Takahashi and Oikawa (Br. 13), the rejections of claims 2, 3, and 6–8 are not separately argued (*see id.* at 5–13). We are not persuaded because we previously found that Takahashi and Oikawa teach the disputed limitations. We refer to the above discussion. Accordingly, Appellants have not persuaded us of error in the rejections of claims 2, 3, and 6–8.

DECISION

We affirm the Examiner's rejections of claims 1–8 under § 103.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED